Eradication of Emerald Ash Borer in Michigan, Ohio, and Indiana
Implementation of the Strategic Plan

EXECUTIVE SUMMARY

Emerald Ash Borer (EAB), *Agrilus planipennis*, is an extremely destructive wood-boring pest of all North American species of ash trees. It was unknown in North America until June 2002, when it was discovered killing ash trees in southeast Michigan and neighboring Windsor, Ontario, Canada.

This non-native pest poses an enormous threat to our urban and rural forests. Unlike many wood inhabiting insects, EAB kills healthy trees. It is so aggressive that ash trees may die within two or three years after they become infested with the beetle. If it is not contained and eradicated, the impact of Emerald Ash Borer on ash in North America will be similar to that of chestnut blight and Dutch elm disease, which devastated woodland and urban forests in the 20th century.

The potential for economic and environmental effects if this wood boring pest were to become established in the United States is extensive. States which become infested could lose billions of dollars in forest products, and quarantines imposed by state and federal agencies may have dire consequences for plant and wood products industries. Severe damage would also occur within the tourist industry. All ash trees are susceptible to EAB attack. According to the Forest Inventory and Analysis data collected by the USDA Forest Service, there are approximately 850 million ash trees in Michigan forests which are at risk; Ohio and Indiana have, respectively, 279,400,000 and 146,900 ash trees in timberland susceptible to EAB infestations. This does not include the millions of ash trees extensively planted in communities, yards, and along public right-of-ways.

Since 2002, APHIS, State, and city cooperators in Michigan, Ohio, Indiana, Virginia, and Maryland have conducted survey and control activities, in addition to the U. S. Forest Service, and have undertaken activities to eradicate this exotic pest. Efforts so far have included imposing quarantines, conducting surveys around confirmed infested sites, removing ash trees, and developing information which will support management efforts. To date, the following states have removed ash trees to control the spread of EAB: 233,784 trees in Michigan; 46,516 trees in Ohio; 9,400 trees in Indiana; 1,000 trees in Maryland; and 287 trees in Virginia. Tree removal in Maryland and Virginia was in response to regulatory incidents in 2003 caused by an illegal shipment of Michigan ash nursery stock into both states. This incident triggered the delimitation surveys followed by tree removals and confirmation surveys.

Originally six (6) counties in Michigan were known to be infested. Intensive survey efforts in 2003 expanded the known infested area to an additional 7 counties, bringing the total number of counties with EAB to 13 counties in Michigan. In 2004, EAB was detected in twenty-six (26) additional counties, including Indiana and Ohio. In December 2004, Michigan added another 7 counties to its quarantine bringing the total to 20 entire counties plus portions of another 15. Twenty (20) of these counties in Michigan and one county in Ohio are considered generally infested. The others appear to have small spot infestations caused by the movement of firewood, nursery stock, or timber.

Lack of effective survey and control technology other than tree removal has made eradication efforts challenging. The 2004 trap tree survey was an attempt to implement another tool for detection of EAB. This improved survey technique, which is less labor intensive than visual survey, provides a better method of detection. A lure-based trapping system, which has yet to be developed, would greatly enhance the program's effectiveness.

This document describes an aggressive joint Federal, State, and local initiative to eliminate this pest from the United States and protect vulnerable urban, forest, and agricultural resources that are at risk. The primary objective is to protect the forest products industry, the ash component of our American forests and park lands, and the urban environment from the destructive impact of EAB. Implementation of the initiative will follow emergency response guidelines that specify the protocols for survey, control, and regulatory activities for areas infested with EAB. These guidelines will be adjusted for each specific site, taking into consideration local

environmental conditions and pest population dynamics. Implementation will also be accomplished in accordance with each respective agency's authorities, regulations, and policies.

I. Background

Emerald Ash Borer was first detected in North America in the summer of 2002 in the Detroit metropolitan area in southeast Michigan and shortly thereafter in neighboring Essex County, Ontario, Canada, but is thought to have been introduced 8 or more years ago. Infestations have been subsequently detected in Ohio in 2003 and in Indiana for the first time in the summer of 2004. Isolated infestations related to quarantine violations were also found in Prince George's County, Maryland, and Fairfax County, Virginia.

The Emerald Ash Borer (EAB), *Agrilus planipennis*, is a non-native insect that poses an enormous threat to our urban and rural forests. The insect is native to Asia and the Russian Far East, where literature suggests that hosts include ash (*Fraxinus*) and possibly walnuts and elms (*Juglans* and *Ulmus*). In North America, EAB has been found only infesting ash (*Fraxinus* spp.) trees. Ash species are common in woodland and also are a major component of the urban canopy in many American communities. Once infested with EAB, a typical ash tree will die in two to three years; however, heavily infested trees may die after only one year, even if healthy when initially attacked.

The potential path of expansion of the EAB infestation is through Ohio and Indiana into the hardwood forests of the Northeast through Pennsylvania and into the Appalachian Mountain States through Kentucky. In addition, spread of the pest through Canada to Wisconsin and New York also exists as a possibility. The economic impact would be devastating if it spread from currently infested areas into the forests of the northeastern United States, where nursery, landscaping, timber, and recreation and tourism industries are economically critical. Nearly 114 million board feet of ash saw timber with a value of $25.1 billion is grown in the eastern United States. White, black, and green ashes are widespread species and an important component in the forests of the northeastern United States and eastern Canada. Together they make up over 7 percent of all hardwood species and 5.5 percent of all species. The wood is used for a variety of applications including tool handles, wooden baseball bats, furniture, flooring, cabinetry, solid wood products, packing materials, pulp, and paper.

The potential national impact of EAB on the urban environment alone is 0.5 to 2 percent loss of total leaf area, or 30-90 million trees with a loss of $20-60 billion dollars. Michigan implemented a moratorium on importing and selling ash nursery stock in the Lower Peninsula of the state, impacting at least 9,519 nurseries. The State's 1,847 logging companies and sawmills are also affected by their inability to receive ash logs from the quarantined area. Additionally, 1,130 private campgrounds in Michigan have been impacted; many are losing campers once they are told they cannot enter with firewood from the quarantined area. Ohio has two major tool handle plants, one of which gets 25 percent of its ash wood from Ohio's ash resource. The continued spread of this pest would threaten these resources and permanently alter the Midwest's forest ecosystem, which in some areas is made up of 20 to 40 percent ash.

In addition to its value in forest ecosystems and for the timber industry, ash has become an extremely popular urban/suburban landscape tree because of its tolerance of less than ideal planting conditions and resistance to gypsy moth and other pests. In fact, it is currently the most commonly planted tree in new residential and new commercial developments. It has been planted widely in Midwest States to replace elms lost to Dutch elm disease, but it is common in parks, other public spaces, and neighborhoods across the United States. The spread of EAB infestations could potentially have an enormous impact on the U.S. nursery industry, municipal governments, and individual home owners. As many as 300 million landscape ash trees have been planted in Michigan alone, with approximately 28 million in the infested area. Removal and replanting costs would be staggering. In an initial economic analysis of EAB, the USDA Forest Service estimated that EAB, if not contained and eradicated, could cause approximately $7 billion in additional costs to state and local governments and landowners to remove and replace dead and dying ash trees in urban and suburban areas over the next 25 years.

Since 2002, APHIS, States, and city cooperators in all affected states, in conjunction with the USDA Forest Service, have undertaken eradication activities by conducting surveys, imposing quarantines, and removing

infested trees. To date, in excess of 290,000 trees have been removed in Indiana, Maryland, Michigan, Ohio, Virginia, and Canada. The USDA Forest Service has worked with State Foresters and city officials to help replace trees removed through EAB program activities.

Emerald Ash Borer Eradication & Containment Actions

YEAR	AREA	COUNTY	STATE	# TREES REMOVED	COMMENTS
2004	Jellystone Campground	Steuben	Indiana	1,100	
2005	Manapogo, Millgrove Township	Steuben	Indiana	2,103	
2005	Jellystone, Jamestown Township	Steuben	Indiana	629	
2005	Millgrove Township	Steuben	Indiana	135	
2005	Shipshewana, Clay Township	LaGrange	Indiana	34,555	
2005	Jellystone/Manapogo/ Shipshewana		Indiana	81,353	Seedling trees>3/4 dbh
TOTAL				**119,875**	
2003	Whitehouse	Lucas	Ohio	6,000	100 trees treated with Imidichloprid
2004	Hicksville	Defiance	Ohio	3,379	
2004	Perrysburg/Rossford	Wood	Ohio	424	
2004	Eaton	Franklin	Ohio	17,713	
2004	Toledo Express Airport	Lucas	Ohio	10,000	
2004	North Baltimore	Wood	Ohio	15,000+	
TOTAL				**46,516**	Updated 04/15/05
Eradication Actions:					
2003	Tipton	Lenawee	Michigan	84	Research plot
2003	St. Clair	St. Clair	Michigan	700+	Research plot
2004	Marshall	Calhoun	Michigan	12193	041302 – 05/20/04
2004	Delta Township	Eaton	Michigan	13,281	041302 - 05/13/04
2004	St. Helen	Roscommon	Michigan	13,941	047201 - 09/16/04
2004	Berrien	St. Joseph	Michigan	21,627	041101 – 09/17/04
2004	Shields	Saginaw	Michigan	20,539	037302 – 04/12/04
2004	Wyoming	Kent	Michigan	16,121	034101 – 05/14/04
TOTAL				**98,486**	
Containment Actions:					
2004	Cottreville	St. Clair	Michigan	53,594	1st cut only
2004	Lansing areas	Ingham	Michigan	40,470	1st cut initiated in Spring;completed 12/04
2004	Potterville	Eaton	Michigan	13,375	1st cut initiated in Spring;completed 10/04
2004	Quincy	Branch	Michigan	27,859	1st cut completed 10/04; 2nd cut completed 12/04
TOTAL				**135,298**	
TOTAL 3 States				**400,175**	

Lack of effective survey and control technology, other than tree removal, has limited progress towards containment and eradication. CPHST's Methods and Development staff (APHIS), the Forest Service, Agricultural Research Service (ARS), and university researchers, are working to provide improved technology for control and eradication. The use of girdled trap trees, a better survey technique, became available for program use in 2004.

This document proposes an aggressive joint Federal, State, and local government initiative to contain and eventually eliminate the pest from the United States and protect vulnerable urban, forest, and agricultural resources currently at risk. Canada is following a similar course of action with their EAB infestation in Essex County. Containment and eventual eradication of EAB are necessary to protect United States and Canadian ash resources. An economic analysis of the EAB situation indicates that damage will be in terms of billions of dollars if nothing is done and would also result in environmental damage and long-term changes in the North American forest structure. Spread of Emerald Ash Borer into non-infested areas must be halted by incorporating the best science and tools into program activities and through effectively curtailing movement of regulated articles that may harbor the pest in order to ultimately eradicate EAB.

II. Primary Objective

The primary objective is to protect the forest products industries, the ash component in our forests and park lands, the access to ash by Native American peoples for cultural purposes, and the quality of the urban environments from the destructive effects of EAB.

III. Implementation Guidelines and Tactics

Implementation of the EAB program will follow management plan guidelines developed in 2003 and 2004 by members of the Science Advisory Panel (SAP) and Federal and State program managers that have experience in pest management. These guidelines specify protocols for survey, control, and regulatory activities for areas infested with EAB, but may be adjusted for specific sites, taking into consideration local environmental conditions, pest population dynamics, and epidemiological considerations.

The strategy proposed by the SAP utilizes natural features to help contain and confine the spread of the pest to the Lower Peninsula of Michigan. The Great Lakes prevent the spread of the pest to the west, north, and east except at two points: the Mackinac Bridge between the Upper and Lower Peninsula, and the 38 mile long border between Michigan and Canada along the St. Clair River. A third "gateway" exists along the Michigan border with Indiana and Ohio. Although extensive, -containment in this gateway is assisted by the preponderance of agricultural land.

The Mackinac gateway and the Michigan-Ohio-Indiana (Tri-state) gateway consist of a 50 mile wide band each. The St. Clair gateway is only 6 miles wide due to the close proximity to the generally infested area. The program utilizes intensive survey, regulatory and control activities in these areas to contain the pest and prevent additional spread.

Survey:

Initially EAB survey methodology and procedures were limited to visual detection of infested trees, which is a labor-intensive activity. Program personnel examined trees for EAB symptoms such as thinning crowns, dead branches, basal sprouting, bark cracks, serpentine larval galleries, and D-shaped exit holes. Efficiency of this survey method was enhanced by the use of tree climbers or bucket trucks to examine tree crowns and other areas, and by use of destructive techniques requiring peeling off of the bark to inspect for developing EAB larvae in serpentine galleries. Visual surveys were conducted using a 1/8 or ¼ mile grid (10 or 40 acres respectively) with one survey point per grid square. Within each survey-grid square, the survey crew performed EAB surveys at sites with the highest risk of EAB infestation.

In 2004, girdled trap trees were utilized on the EAB program. Where possible, these ash trees were located on highway rights-of-way and were naturally occurring, not landscape ash trees. These trees were girdled by using a draw knife to remove all bark from an area approximately 6 inches wide, 4 feet above the ground, and encompassing the entire circumference of the tree. Shrink wrap material was wrapped around the tree above the wounded area and then tangle-foot was applied to capture EAB adults attracted to the tree. The tree was marked with flagging tape or paint and then tagged to identify it as a program monitoring tree. Trees were re-examined at six week intervals, and beginning in October, they were felled, the bark peeled and examined for any life stages.

The use of trap trees in combination with visual surveys allowed the program to cover both the Upper and Lower Peninsulas of Michigan in calendar year 2004, which is at least a 50% increase over 2003 efforts when only visual survey was used. Preliminary analysis indicates that girdled trap trees provide a better method of detection of low density EAB populations when compared to visual survey, but are not as effective as a lure-based trapping system available for some other insects. It appears that trap trees are efficient in detecting EAB in areas with multi-year populations, or serve as a good tool for targeted survey in areas of higher risk, such as campgrounds, new housing or business developments with recent landscaping, and commercial entities handling or vending ash wood products (i.e. firewood). Their precise efficiency has yet to be determined.

The program priorities for 2005 include finding outlying populations and delimiting them in order to eradicate EAB, especially any populations moving toward the Mackinac Bridge area in northern Michigan, the St. Clair area adjacent to Canada, or at the southern border of Michigan adjacent to Ohio or Indiana. These areas are referred to as "gateways," areas from which EAB can spread into uninfested portions of other states or Canada. Known infested areas must also be delimited according to the following criteria:

- Proximity to a "gateway"
- Distance from the generally infested area
- Proximity to a major host tree resource
- Other mitigating factors, including age of infestation, geographic size, etc.

All high risk sites (sawmills, nurseries, campgrounds, arborists, landscapers, and firewood dealers will also continue to be targeted for survey. All public "call in" information regarding possible infestations, mainly reported through program hotlines, will be evaluated and investigated.

The **Science Advisory Panel** (SAP) recommends the following specific survey activities in 2005:

Indiana must conduct a systematic survey with a base layer of nine trap to eighteen trap trees/township supplemented with visual survey in the northern 50 mile portion of the state bordering Michigan. They will continue to target all high risk sites for survey (sawmills, nurseries, campgrounds, arborists, landscapers, firewood dealers and "call-ins" from the public.

Ohio will conduct a systematic survey with a base layer of a nine to eighteen trap trees/twp supplemented with a visual survey in the northern 50 miles of the state bordering Michigan. They will survey more intensively (up to 36 trap trees plus visual) along the apparent leading edge of infestation in Lucas Co. along the Maumee River and south of the Hillsdale County, Michigan infestation. The objective is to define the leading edge so that control and containment activities can be effective. They will continue to target high risk sites for survey, as in the Indiana survey recommendations.

No general survey is recommended for the 20 county quarantine area in Michigan in 2005. Survey will occur in the following areas of Michigan:

- A band six miles wide (one township), adjacent to the west side of the St. Clair River will be systematically surveyed using 36 trap trees/twp. This survey will be supplemented with visual survey.
- A second band north of a line which forms the southern boundary of the Antrim, Otsego, Montmorency, and Alpena Counties and south of the Mackinac Bridge will be surveyed from 9 to 18 trap trees/township.

- The third band consists of the Michigan counties bordering Ohio and Indiana outside the quarantine area (i.e. the gateway counties of Berrien, Cass, St. Joseph Counties) should be surveyed with 9 to 18 trap trees/township.
- The remainder of the Lower Peninsula should be systematically surveyed at nine trap trees/township.
- The Upper Peninsula should be systematically surveyed with trap trees using from 4 to 9 trap trees per township.
- The southern row of townships in Branch and Hillsdale Counties will be surveyed with 9 to 18 trap trees per township.

Control:

The principal control technique before 2004 has been the removal of trees discovered with life stages of EAB and those adjacent trees within a half mile radius from the point of infestation, followed by an herbicide treatment for woodlot trees or grinding of stumps for landscape trees. Alternatives to tree removal, such as felling and leaving infested trees, insecticide treatments, etc. are being explored. Alternatives to tree removal should be approved by the Management Team before implementation.

The low, but unknown efficiency of visual and trap tree surveys to detect infestations dictates equality in terms of program response to the following:

- Discovery of exit holes in standing trees
- The presence of EAB larvae
- The capture of an adult EAB in a trap tree

The first response to any EAB positive find will be additional detection/delimitation efforts to locate other infested trees, including the use of more aggressive survey techniques, such as the use of tree climbers or bucket trucks, and the felling and peeling of suspect trees, or a combination of these.

Control measures to be considered by the EAB program are as follows

If the infestation is threatening a gateway (within or beyond), it is found in Indiana, Ohio or found in a non-infested state:

- Perform a minimum of a half mile radius cut around all infested trees and resurvey the following year at a higher trap tree density.

If the site is outside the 20 county quarantine area of Michigan, not threatening a gateway, but is considered:

- Infested: perform a half mile radius cut around all infested trees and resurvey the following year at a higher trap tree density; or
- Infested: use an approved treatment (herbicide, insecticide, etc) within a half mile radius of the identified tree and resurvey the following year at a higher trap tree density; or
- Infested: use a combination of tree removal and an approved treatment (herbicide, insecticide, etc) and resurvey the following year at a higher trap tree density. Tree removals at a minimum level of **200** yards from the identified infested tree(s) will be performed for suppression purposes.

Regulatory:

Regulatory activity will focus on preventing the artificial spread of the pest to new areas. Program surveys in 2004 have resulted in an increase of the regulated area from 5,400 square miles to approximately 41,000 square miles, increasing the regulatory responsibilities of program staff. Regulatory inspections and contacts will be increased, with a commensurate increase in staffing for that program section in order to accomplish the additional workload. Establishments will be defined by their risk.

Regulatory personnel will be responsible for the following:

- Inspecting and issuing certification documents for ash products.

- Conducting compliance checks and other inspectional activities.
- Working with Public Relations staff to convey program goals and regulations to industry, government, cooperators, etc.
- Assisting cooperators in carrying out regulatory activities designed to stop the spread of EAB.
- Assisting cooperators in carrying out control activities designed to eradicate EAB.

Outreach:

Ongoing public awareness campaigns are designed to provide education to residents and encourage their cooperation and support in reporting possible beetle damage in their area and suspected incidents of quarantine violations. Public affairs personnel will also institute "gateway" initiatives, such as development of billboard signage, arranging for public service announcements and newspaper articles, and participating in public venues. Their responsibilities will also include development and distribution of additional informational brochures, public surveys, and posters.

As part of public awareness activities, Public affairs personnel will provide updated information for the regional website at *www.emeraldashborer.info*.

The focus of outreach and education is to encourage the active participation of target audiences in preventing the spread of emerald ash borer throughout the United States. This is achieved through a variety of initiatives including public meetings, industry seminars, networking, distribution of informational materials, advertising, direct mail and promotional activities. Any state with an ash resource constitutes a potential target for our messages. Messages will change as the program evolves and messages will be developed to meet the specific needs of each state involved.

Data Management:

An enhanced computerized database is being implemented to better process program data. Data collected by survey and regulatory crews is submitted daily. Electronic data collection devices, such as GPS and laptop computers to promote speed and accuracy in submitting data and to maintain "real time" information, are being used in the field and in the Brighton, Michigan office. The database information will be analyzed to look for patterns and trends, to draw conclusions about rate and direction of spread, and ultimately to determine the course of actions needed in the various zones.

IV. Eradication Action Plan

The implementation of the strategic plan for EAB containment and eradication requires a coordinated effort from local, States, and Federal program leaders. The plan incorporates components and tactics that are sufficiently flexible to accommodate most adjustments or modifications if the scope of the program changes or alternative methodologies or technologies becomes available.

IV. 1 General Strategy for Outbreaks

Years 2005-2006: Phase-In, Delimitation, and Containment

During this phase of the program, a containment strategy will be implemented, focusing on keeping EAB populations out of uninfested areas by protecting the identified "gateways." This will necessitate the realignment of many of the currently existing program offices in order to place work space in areas where personnel will more easily have access to the principal workload. Some existing staff will be relocated and additional employees will be hired in order to accomplish these activities. Time will be needed to locate and lease appropriate offices and to interview and hire new personnel. A year phase-in period is thus anticipated before full program activity implementation will be achieved.

The restructuring of the EAB program, based on recommendations from the Science Advisory Panel, is based on an approach which concentrates resources on defensible corridor areas called "gateways:" the Mackinac Bridge adjacent to the Upper Peninsula of Michigan; the St. Clair River shoreline between Michigan and Canada; and, a 50 mile band stretching from Lake Michigan to Lake Erie through Indiana, Michigan, and Ohio.

Survey: the visual survey will continue to target all high risk sites for survey (sawmills, nurseries, pallet companies, campgrounds, arborists, landscapers, firewood dealers).

A systematic survey with a base layer of 9 to 18 trap trees per township supplemented with visual survey in along a 50 mile band bordering Michigan and Indiana, and northern Ohio. In addition, Ohio will survey more intensively (trap trees and visual) along the apparent leading edge of the infestation in Lucas County along the Maumee River and south of the Hillsdale infestation. This area is one of two where presently EAB populations are threatening the gateway to uninfested areas. The other critical area is along the St. Clair River.

- Michigan will systematically survey a band of six miles wide (one township) adjacent to the west side of the St. Clair River by using 36 trap trees per township.
- A second band north of a line which forms the southern boundary of the Antrim, Otsego, Montmorency, and Alpena Counties and south of the Mackinac Bridge will be surveyed from 9 to 18 trap trees/township. This survey will be supplemented with visual survey.
- The southern most tier of counties bordering Ohio and Indiana (Berrien, Cass, St. Joseph), and the southern most tier of townships in Branch, Hillsdale, Lenawee, and Monroe will be trapped at 9 to 18 trap trees per township.

Containment: the Science Advisory Panel (SAP) recommends activities to reduce the ash component or treat ash in an area that is at a minimum of six miles wide. Through existing programs and authorities, the USDA Forest Service will work with State Foresters to develop ash management guidelines and to encourage their incorporation into stewardship plans for private forest lands and management plans for state-owned forest lands. Where appropriate, the Forest Service may develop its own ash management guidelines and look for opportunities to incorporate them into management plans for national forests at risk to EAB or affected by EAB program activities.

Efforts will be initiated to reduce the volume of ash host material in the northern portion of the Lower Peninsula of Michigan, northern Ohio and Indiana, through ash utilization and management efforts. The USDA Forest Service will work with the state foresters to formulate plans to reduce ash in high priority EAB project areas in ash woodlands and in urban and suburban areas. These plans will be implemented to the extent that federal and state funding is available. Other federal agencies, such as USDA NRCS, could be encouraged to develop EAB priority areas in their programs to manipulate ash management. State plant pest regulatory should work with other state agencies such as the transportation departments to reduce ash along public roadway and other rights-of-way under their jurisdiction. Significant reductions in the density, basal area, and continuity of ash resources will help to prevent EAB populations from reaching high densities that will be likely to spread by either natural or artificial means into the Upper Peninsula or neighboring states and provinces.

Within this six mile wide band, efforts will be made to aggressively detect and eradicate infestations (high trap tree density and highly intensive visual survey). The SAP recommends the southeastern anchor for this zone should be the area along the Maumee Rive in Ohio. The zone will continue west through Ohio and possibly northern Indiana or southern Michigan. The exact location of this zone should be dictated by density of host material and the proximity of infestations. Within the six mile wide zone, high intensity (36 trap trees per township) survey will be performed along the St. Clair River. Infestations should be treated as if they are isolated infestations, i.e. removal of all trees within a half mile of an infested tree. The program will consider the use of all tactics including the use of pesticides, felling and leaving, herbicide treatments, best management practices, and wood utilization initiatives as a means for making this band uninhabitable for EAB.

Regulatory:

Regulatory activity will assist in preventing the artificial spread of the pest to new areas. Program surveys in 2004 have resulted in an increase of the regulated area from 5,400 square miles to approximately 41,000 square miles, increasing the regulatory responsibilities of program staff. As a result, regulatory inspections and contacts will be increased, with a commensurate increase in staffing for that program section in order to accomplish the additional workload. Establishments will continue to be defined by their risk.

There are three focal points for regulatory activity in the EAB program:

- Establishment and implementation of uniform compliance stipulations for all cooperating individuals and businesses handling regulated articles.
- Identification and monitoring of those individuals and businesses representing a risk for moving EAB infested material that are unable or unwilling to comply with compliance stipulations and/or quarantine regulations.
- Development and performance of special operations to intensely concentrate regulatory resources on a given mode of artificial spread for a short interval.

The difficulties presented for the EAB program include the lack of commercially economic treatments for firewood production and a pest that is regulated by multiple state departments of agriculture as well as the federal government. The standardization of compliance agreements is being accomplished by regulatory managers in concert with cooperators in order to more efficiently work with the regulated industries conducting business in all of the affected states. Numbers of concerns under compliance will increase as more and more ash in the quarantined areas declines and is removed by proprietors seeking value for the fallen timber. Monitoring of compliance agreements will require a substantial commitment of personnel until quarantines are removed.

The information supporting the regulatory focus of identifying high risk pathways of artificial spread is contained within a regulatory data base. This database contains all identified concerns (vendors, handlers, movers) handling regulated material along with their assigned risk level. The risk level is determined by use of a risk matrix table developed for this program, which results in a numerical risk assignment. This risk level determines the baseline frequency of monitoring. Businesses of interest are identified by web searches, state business licenses, trade organizations, yellow pages, personal information, and site visits. Every establishment contacted is given an information packet describing EAB, its damage, explanation of the quarantine, and information on ash resources. Each contact with a business is maintained in the data base, creating an interaction history. Establishments can then be mapped by any number of factors including: geographic area, regulated activity, risk level and/or contact history. Maps and reports are used to further identify areas of risk and plan regulatory work. Locations given highest priority for regulatory mapping are the northern and southern gateways for dispersal of the beetle, as identified by the Science Advisory Panel. Regulatory activity is ongoing on both sides of the gateways to educate the public and identify high risk pathways. A third area of concentration is a strip across mid-Michigan. This area is being targeted to reinforce containment of the spread of EAB from the quarantined area of the state towards the northern area of Michigan's Lower Peninsula. This process will remain a dynamic function of the regulatory force due to the ephemeral and low profile nature of individuals involved in sale and movement of firewood.

APHIS and the Forest Service will work out the specific agency roles and responsibilities regarding how to address timber sales on national forests which may occur in regulated areas when spot infestations are detected or when EAG naturally spreads into national forests.

The third aspect of regulatory activity is to identify and conduct special operations or blitzes to serve as deterrents and quality control for movement of regulated articles. These operations are conducted in concert with state cooperators or as stand alone federal operations. Current operations include: blitzes to regulate movement of firewood by private citizens and commercial dealers; blitzes to monitor commercial log transport routes; and, quality control monitoring at rest areas and weigh stations, checking movement of regulated articles and public awareness.

Outreach: Outreach is a critical component that supports regulatory, survey, and control components of the program. Public relations campaigns focused on industries which may move EAB will be expanded. Ongoing

public awareness campaigns will be designed to provide education to residents about moving infested host materials such as firewood and will encourage their support in recognizing and reporting possible beetle damage in their area. Public affairs personnel will also institute "gateway" initiatives, such as development of billboard signage, arranging for public service announcements and newspaper articles, and participating in public venues.

Years 2007-2009: Suppression and Control

Survey, public outreach, and regulatory activities are ongoing during this period. Control activities will have begun in all areas. The EAB program anticipates finding some new infested areas each year.

Control: states with confirmed active EAB populations will eradicate all outlying infestations using the following priorities:

- Proximity to a "gateway"
- Distance from the generally infested area
- Proximity to a major host tree resource
- Other mitigating factors, including age of infestation, geographic size, etc.

When a confirmed population is isolated ("outlier"), an area within a half mile radius from any infested tree (last known positive) will be removed. Stumps will be treated with herbicide or ground. Using pesticide and herbicide applications in these areas to treat apparently uninfested trees should be considered when these alternatives are economically viable and/or the circumstances do not permit timely tree removal. To suppress infestations, cuts of less than a half mile radius, combined with insecticide/herbicide treatments will be used. This will only be considered if the objective is containment of populations threatening a "gateway." In these circumstances, the program will consider all tactics at their disposal to obtain the desired maximum effect.

We anticipate that survey activities over the prior three years will have identified additional EAB infested areas threatening or within established gateways. Control activities will peak during this period in order to manage these infestations. We anticipate new treatment initiatives developed in the last three years will more efficiently impact pest populations by effectively suppressing natural spread and eradicating isolated infestations. A lure based trapping system will replace visual and trap tree survey techniques. An effective biological control mechanism will be put in place.

Regulatory: regulatory personnel will be responsible for the following activities:

- Inspecting and issuing certification documents for ash products.
- Conducting compliance checks and other inspectional activities.
- Working with Public Relations staff to convey program goals and regulations to industry, government, cooperators, etc.
- Assisting cooperators in carrying out regulatory activities designed to stop the spread of EAB.
- Assisting cooperators in carrying out control activities designed to eradicate EAB.
- Conducting special operations or blitzes to serve as deterrents and quality control for movement of regulated articles.

Years 2010-2014: Deregulation

Systematic survey activities will continue. After four or five years of survey with no indication of beetle presence, a regulated area is eligible to be removed from quarantine regulations.

The Program will continue suppression and eradication initiatives. There will be limited survey in quarantined counties with removal of any remaining ash in these areas.

The EAB program will eliminate all known "outliers" by completing eradication tree removals out to ½ mile, and then maintain surveys around all outliers outside the core.

Regulatory and public outreach activities will be continued in this period.

Years 2015-2018: Eradication

Verification surveys in all areas between the "gateways" will continue and will include the original Michigan core counties. We plan to conduct surveys according to the emergency response guidelines for four years after the last sign of active EAB presence in an area was recorded. After four years of negative results in an outbreak area, EAB will be declared eradicated from an area. Complete eradication of EAB from Indiana and Ohio in 2016, and Michigan is expected in 2018.

IV.2 Prevention and Early Detection

A wide variety of exotic tree pests can readily be transported into the United States on untreated wooden pallets, crating, bracing, and other solid wood packing materials (SWPM). Nearly all (97 percent) of the quarantine-significant tree pests found by port inspectors are associated with SWPM.

The USDA's Animal and Plant Health Inspection Service (APHIS) pest risk analysis indicates that EAB hitchhiked to the United States in sold wood packing materials (SWPM), such as crates and pallets, from China. In the last 15 years, trade with China has increased tremendously to $62 billion a year, which is up from $5 billion in 1985. As a result, the volume of pallets and crates passing through ports of entry has grown exponentially.

APHIS has published the Final Rule for new requirements concerning the importation of wood packaging material. The implementation date for regulatory enforcement is September 16, 2005. APHIS has set standards for Wood Packaging Material imported into the USA through 7 CFR 319.40 - Importation of Wood Packaging Material, as published on September 16, 2004. The regulations for importing logs, lumber, and other unmanufactured wood articles have been amended by adding treatment and documentation requirements for solid wood packing material (SWPM) imported from China, such as wooden pallets, crating, dunnage, and other wooden packing material, which will now require heat treatments, fumigation, or treatment with preservatives prior to departure from China.

Early detection is essential to successful and efficient eradication of an exotic pest. Discovery of the pest at a stage when the infestation level is low allows managers more flexibility in tactics and control methodologies, providing a greater chance of success for eradication. Upon discovery, immediate and aggressive actions to eliminate the pest results in shorter and less expensive eradication programs. In 2005, EAB national survey was conducted as a portion of the Exotic Wood Boring-Bark Beetle Survey. In 2006, APHIS will implement a national survey for EAB to determine the presence or density of the pest in states not previously identified.

V. Scientific Support

Scientific support has played a significant role in the development of the program and is expected to contribute additional technical advancements and program efficiencies throughout the life of the program. Major accomplishments thus far include: the use of trap trees for survey; descriptions of early EAB damage, which has enhanced visual survey; a knowledge of the dispersal behavior and distance which have provided the basis for eradication of spot infestations; a better, although still incomplete, knowledge of EAB biology and its host range. This knowledge has provided a better direction of survey activities and a sound basis for an economic analysis. Also, several pesticides have been identified that are efficacious to adult and larval stages. They could be incorporated into the program's control and containment activities.

In the near future, ongoing research and methods development is expected to provide additional improvements and enhancements to program components such as: improved regulatory treatments for logs and firewood; and, practical efficacious control methods for adults and larvae. These will include biological-based approaches

involving pathogens and parasites. Also, additional improvements in survey tools are expected as the cues the adult EAB use to find host trees and each other are characterized and incorporated into survey tools.

VI. Role of Cooperators

The present plan has been produced in collaboration and consultation with State and local cooperators and the USDA Forest Service. The USDA-APHIS and State and local cooperators will take the lead in managing the survey, regulatory, control, data management, and public awareness operations in the outbreak areas. The specific roles of cooperators will vary between States. Program managers will determine roles and responsibilities in each State as dictated by legal authorities, expertise, administrative and technical strengths, and available staff, resources, and equipment. The USDA-APHIS will also conduct a national survey targeted at areas in proximity to distribution centers, warehouses, manufacturers, and other entities that receive shipments of materials from China. Also, the USDA-APHIS will accomplish a national public awareness campaign to augment ongoing EAB exclusion efforts.

The USDA Forest Service has actively supported the EAB program since 2002 through its State and Private Forestry and Research and Development branches. The agency's National Forest System branch is now also involved due to the presence of two EAB outlier spots adjacent to the Huron Manistee National Forest in Michigan. The Forest Service intends to prepare its own EAB implementation plan as a companion piece to this plan. The Forest Service document will outline the various roles and responsibilities of each branch of the agency and provide greater detail on how the agency plans to coordinate with the federal and state plant pest regulatory agencies to implement the recommendations of the SAP using existing program authorities, funding, and partnerships with others. The Forest Service response will build upon the roles and responsibilities previously charted out for EAB. To date these include:

Technical and Scientific Support: provide technical and scientific support to APHIS and state plant pest regulatory agencies to detect, contain, and eradicate EAB in the program area. This includes ash management and utilization assistance and advice.

Survey and Detection: promote and support EAB early detection on federal, tribal, and cooperative lands outside of the EAB program area. Cooperate with APHIS through a MOU to survey, regulate, and eradicate EAB infestations on national forest system lands.

Restoration: assist communities affected by EAB to recover from the loss of their ash trees.

VII. Public Awareness and Outreach

The public outreach component is an integral part of the EAB program. Ongoing public awareness campaigns will be designed to provide education to residents and encourage their support in reporting possible beetle damage in their area. Since the beetle is difficult to detect and there are presently no effective lure-trapping technique for this insect, the more people trained to spot symptoms and damage of EAB and report these signs, the better the chance of successful eradication. Public affairs personnel will also institute "gateway" initiatives, such as development of billboard signage, arranging for public service announcements and newspaper articles, and participating in public venues in order to reach as wide an audience as possible.

The EAB public affairs campaign focuses on (1) increasing public/industry awareness of the program, specifically the artificial spread of emerald ash borer through the movement of firewood, logs and other ash material and (2) engaging the public/industry to support & participate in the program. In addition, the campaign provides support to regulatory staff, management, and other program partners involved in program objectives.

The focus of outreach and education is to encourage the active participation of target audiences in preventing the spread of emerald ash borer throughout the United States. This is achieved through a variety of initiatives including public meetings, industry seminars, networking, distribution of informational materials, advertising,

direct mail and promotional activities. Any state with an ash resource constitutes a potential target for our messages. Messages will change as the program evolves.

VIII. Budget and Equipment

The primary components of the program are survey, regulatory, and control activities. Survey is required throughout the program for a variety of reasons: first to detect and determine where regulatory and control program activities are needed; second, to monitor the effectiveness of these activities and make program adjustments accordingly; and, third, to verify that eradication is complete and successful. With currently available technology and methodology, the survey component accounts for approximately 25% of program costs.

The cost of the control program is approximately 49%. Tree removals and stump treatments account for the majority of these costs. These costs should decrease as alternatives, such as pesticide treatments, cut and leave, and herbicide treatments, are utilized, and as the numbers of new finds decrease.

IX. Staffing

In order to achieve the goals of this strategic plan, increased staffing and resources will be required. This organizational chart exhibits the staffing required to deliver this program in FY 2004 (22 employees).

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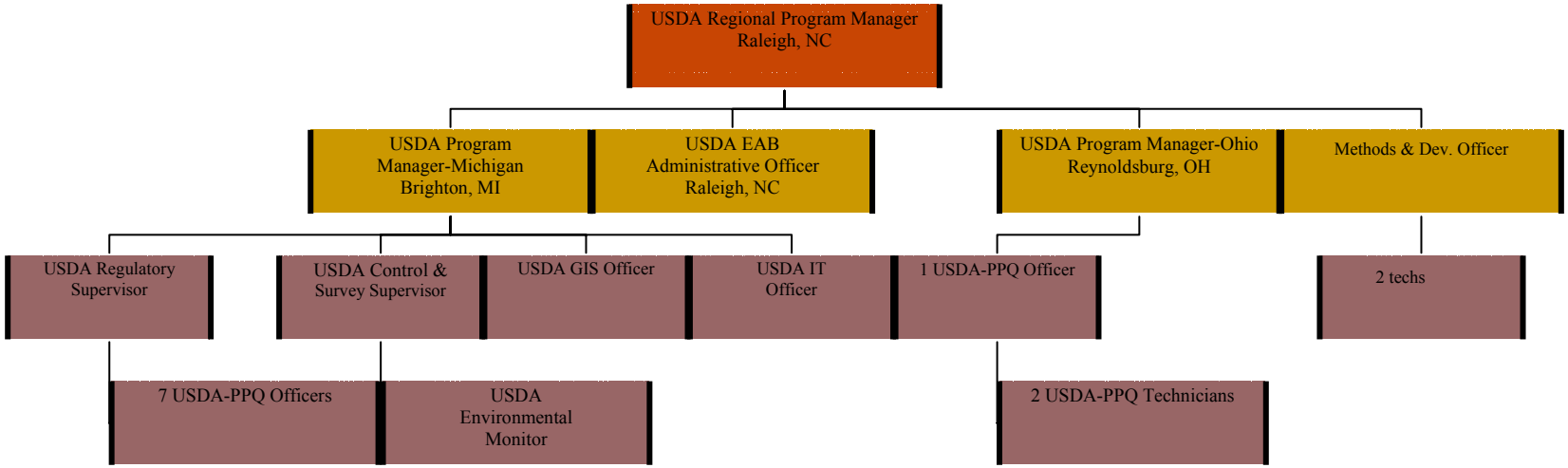

X. Assessment and Evaluation

Science Advisory Panel meetings are held at least twice yearly in order to review program progress as related to the best science available to the field for control and eradication of Emerald Ash Borer and the implementation of those tools as developed by USDA Methods and Development, the Forest Service, universities, etc.

A program review will be conducted late in 2005, three years after inception of the EAB program. These reviews will be accomplished by a panel of individuals outside of the program who have experience in aspects of large scale eradication programs. This will be initiated every three to four years for the life of the program in order to assess the success of field activities as well as review of the administrative and budget aspects of the program.

Key References

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Contact Information

This document was prepared by Deborah McPartlan, USDA, APHIS, PPQ, Pest Detection and Management Program staff, 4700 River Road, Riverdale, MD 20738, (301) 734-5356; Phil Bell, USDA Regional Program Director, USDA, APHIS, PPQ, Eastern Region, 920 Main Campus Drive, Suite 200, Raleigh, NC 27606-5202, (919) 855-7312; and, Craig Kellogg, EAB Program Director-Michigan, 5356 Ford Court, Suite 200, Brighton, MI 48116-8511 (810) 844-27